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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,812	08/21/2003	Koichi Terashima	Q75721	6181

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EXAMINER

LANDAU, MATTHEW C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 02/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/644,812	<b>Applicant(s)</b> TERASHIMA, KOICHI	
	<b>Examiner</b> Matthew Landau	<b>Art Unit</b> 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2005.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 8-10, 12, 13 and 16-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 11, 14 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/21/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election without traverse of Group I (claims 1-15) and Species I in the replies filed on August 24, 2004 and January 12, 2005 (respectively) is acknowledged.

Applicant indicated claims 1-5, 11, 14, and 15 read on the elected species. After reviewing the drawings, it appears claims 6 and 7 also read on the elected species, since Figure 4 shows a thin film layer 21 other than the germanium containing layer 20. Therefore, claims 8-10, 12, 13, and 16-21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention/species, there being no allowable generic or linking claim.

### ***Claim Objections***

Claims 1, 3-6, and 14 are objected to because of the following informalities:

Regarding claim 1, the limitation "at least one isolation region buried insulating material" is objected to. It is suggested the limitation be changed to "at least one isolation region comprising buried insulating material" (or to something similar). Note claim 14 has the same problem.

Regarding claim 3, there is insufficient antecedent basis for "the vicinity". Also, it is unclear how the limitation "from a surface..." fits in with the rest of the claim.

Regarding claim 4, it is suggested the limitation "doped carbon" be changed to "doped with carbon".

Regarding claim 5, the limitation "germanium thin film layer" should be changed to "germanium thin film layers".

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Regarding claim 6, there is insufficient antecedent basis for “the silicon substrate”.

Further regarding claim 6, the limitation “wherein said semiconductor substrate includes at least one other thin layer or a part of the silicon substrate” is objected. This limitation is confusing since it could be construed as simply requiring the semiconductor substrate to include a part of the substrate, which seems to be redundant. Also, it is unclear how the limitation “from the surface...” fits in with the rest of the claim.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-7, 11, 14, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Comfort et al. (US Pat. 6,266,813, hereinafter Comfort).

Regarding claim 1, Figures 1-3 of Comfort disclose a semiconductor device comprising: a semiconductor substrate 10/20/30; at least one isolation region buried insulating material 80 in a trench formed in said semiconductor substrate; a plurality of films (60/70) in at least one part of a bounded area between said semiconductor substrate and said isolation region; wherein said plurality of films comprise a silicon thin film 60 and a silicon oxide film 70; and wherein said silicon thin film is nearer to said substrate than said silicon oxide film.

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Regarding claims 3 and 5, Figures 1-3 of Comfort disclose the semiconductor substrate 10/20/30 comprises at least one semiconductor thin film layer 20 including germanium in at least the vicinity of said isolation region from a surface of said semiconductor substrate to the bottom of the trench.

Regarding claim 4, Figures 1-3 of Comfort disclose said semiconductor thin film layer including germanium is a silicon-germanium mixed crystal layer. Note that Comfort discloses SiGe layer 20 is formed on a single crystal silicon substrate (col. 3, lines 62-64) by epitaxy (col. 4, lines 10-13). Therefore, SiGe layer 20 must be a mixed crystal layer.

Regarding claim 6, Figures 1-3 of Comfort disclose said semiconductor substrate 10/20/30 includes at least one other thin film layer 30 from the surface of said semiconductor substrate to the bottom of said trench.

Regarding claim 7, Figures 1-3 of Comfort disclose the surface of said semiconductor substrate 10/20/30 comprises a silicon thin film layer 30.

Regarding claim 11, Figures 1-3 of Comfort disclose said insulating material comprises a silicon oxide film 80 (col. 3, lines 57-59).

Regarding claim 14, Figures 1-3 of Comfort disclose a semiconductor device comprising: a semiconductor substrate 10/20/30; at least one isolation region buried insulating material 80 in a trench formed in said semiconductor substrate; a plurality of films (60/70) in at least one part of a bounded area between said semiconductor substrate and said isolation region; wherein the semiconductor substrate 10/20/30 comprises at least one semiconductor thin film layer 20 including germanium in at least the vicinity of said isolation region from a surface of said semiconductor substrate to the bottom of the trench.

Regarding claim 15, Figures 1-3 of Comfort disclose the nearest film of said plurality of films to said semiconductor substrate comprises silicon thin film 60.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Comfort in view of Rogers et al. (US Pat. 4,656,497, hereinafter Rogers).

The difference between Comfort and the claimed invention is a silicon nitride film between said silicon oxide film and said insulating material. Figure 7 of Rogers discloses a trench isolation region with a silicon nitride layer 18 between a silicon oxide layer 16 and an insulating material (oxide) 19. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Comfort by including a silicon nitride layer between silicon oxide layer 70 and insulating layer 80. The ordinary artisan would have been motivated to modify Comfort in the manner described above for the purpose of providing a barrier to protect the underlying silicon oxide film and substrate from undesirable effects (for instance doping and oxidation) that can occur during subsequent processing of the device (col. 6, lines 50-57 of Rogers).


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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
TOM THOMAS  
SUPERVISORY PATENT EXAMINER

Matthew C. Landau

Examiner

February 18, 2005